

## Contingency Planning for Oil Spill Accidents in Brazil

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### Synopsis

Following the 1,300 m<sup>3</sup> (340,000 gallons) oil spill occurred in January 2000 in the Guanabara Bay, Rio de Janeiro, RJ, Brazil, the National Environment Council (CONAMA) enacted Resolution 265/00, which provides requirements to the authorities to prepare or revise the national contingency plan and the regional, state and local emergency plans for oil spill accidents.

Also driven by the Guanabara Bay accident, Law 9966 was passed in April 2000 on the prevention and control of pollution caused by oil releases to Brazilian jurisdictional waters. The Law requires, among other things, that:

- facilities prepare individual emergency plans;
- environmental authorities organize individual emergency plans in the form of local or regional contingency plans.

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In response to the requirements of Resolution 265/00 and Law 9966, the Brazilian Ministry of Environment established two workgroups with representatives from a number of sectors and institutions to develop proposals for regulations concerning the Individual Emergency Plans and Area Plans, and the National Contingency Plan for oil spill incidents. In May 2001, the workgroups concluded the respective proposals.

The aims of this paper are:

- to describe some important accidents related to oil activities in Brazil;
- to present the proposals of Brazilian regulations concerning oil spill planning and response.

## **1. Important accidents related to oil activities in Brazil**

### **1.1. Offshore E&P accidents**

Brazil has registered the occurrence of serious accidents during oil and gas offshore exploration and production activities. Two of these accidents involved the Enchova platform in the Campos Basin, Rio de Janeiro, in 1984 and 1988. In the first one, which occurred on August 16, 1984, two gas eruptions followed by a strong explosion caused a fire on the central platform of Enchova. During the attempt to abandon the platform, one of the boats slipped from the security cables, falling into the sea from a height of 20 meters, causing the death of 27 workers.

In April 1988 another eruption occurred in a well linked to Enchova's central platform, starting a fire which completely destroyed the unit and lasted for about one month before being extinguished. In spite of the severity of the accident, and the large number of people present – the platform was going through repair and there was a floating hotel stationed alongside it – no deaths occurred. This was due to the fact that the wind was blowing contrary to the gas escape, avoiding immediate fire, thus permitting the prompt evacuation of the premises.

More recently, in May 2001, another severe accident involved a production unit in the Campos Basin, causing the death of 11 workers and the sinking of P-36 semi-submersible platform. P-36 was in operation since May 2000, at approximately 120 km from the coast, in the Roncador field, in a water depth of 1,360 meters. Worth about half a billion dollars, P-36 was the world's largest semi-submersible production platform, with a daily processing capacity of 180,000 barrels of oil and 7.2 million m<sup>3</sup> of natural gas. At the time of the accident, the unit was producing about 84,000 barrels of oil and 1.3 million m<sup>3</sup> of natural gas coming from six wells connected to the platform. There was 175 people on board.

The accident took place in the first hours of the morning of March 15, 2001, beginning with an explosion inside one of the platform columns, followed by a second explosion about 20 minutes later. This explosion caused the death of 11 members of the fire brigade, the flooding of the column and subsequent loss of stability of the unit. The incident investigation concluded that the cause of the first explosion was the overpressurization and rupture of a tank, causing the release of the fluids which originated the second explosion.

Evacuation of 138 persons took place after the explosions, lasting for about two and a half hours, leaving behind only the emergency team. After all efforts were made in order to stabilize the platform, the emergency team also abandoned the unit.

With the flooding, the platform progressively started to capsize. Some attempts were made in order to expel the water and regain the stability of the unit, such as the injection of nitrogen and compressed air into the flooded compartments. These attempts, however, did not succeed, not avoiding the sinking of the platform five days later.



**Figure 1 – Platform P-36, Campos Basin, Rio de Janeiro, Brazil, 15 March 2001**

Source: Petrobras

Three weeks after the sinking of P-36, a well eruption occurred on other platform in the Campos Basin, the P-7. The accident provoked the spillage of 26,000 liters (6,864 gallons) of oil, and the evacuation of the 106 persons aboard the unit.

## 1.2. Pipeline accidents

One of the most serious accidents related to pipeline oil transportation occurred in 1984 when a major spill of some 700,000 liters (184,800 gallons) of gasoline caused a fire in Cubatão, São Paulo, Brazil. The leak occurred in an 18-in. pipeline located near the shantytown of Vila Socó, where approximately 8,000 people lived. The fire, which lasted almost 10 hours, started in the early morning, but the gasoline leak had been perceived by some of the residents at least two hours before the fire began. There are some reports that residents had begun to collect and stockpile the spilled gasoline in their homes. The fire resulted in the complete destruction of an area of 100,000 m<sup>2</sup>, nearly 75% of the shantytown. The bodies of 67 persons – almost all burned beyond recognition – were recovered from the ruins of their homes. Among the more than 200 seriously injured, many were unable to survive the severity of their burns and died. In any event, the number of fatalities commonly attributed to the fire (508) exceeds by a considerable margin the official number of fatalities.



**Figure 2 – Vila Socó, Cubatão, São Paulo, Brazil, 25 February 1984**

Source: Petrobras

Two recent pipeline accidents resulted in the spilling of large quantities of oil causing relevant environmental damage. In the first one, occurred on January 18, 2000, in the Guanabara Bay, Rio de Janeiro, 1,300 m<sup>3</sup> (344,000 gallons) of fuel oil were released into the bay's waters. The leakage, caused by the rupture of a pipe between Duque de Caxias refinery and an oil terminal, lasted four hours and reached the nearby mangrove preserve. The same pipe had already suffered a smaller leakage in 1997. There was no monitoring devices able to interrupt the flow automatically and the operators, which did not follow the safety routine, used a motor vehicle and then an helicopter to check what was happening before interrupting the pumping of the oil. Once acknowledged the leakage, there were no means for immediate containing of the oil, which spread throughout the bay and damaged important activities such as fishing and tourism.

The second accident occurred in July 16, 2000, when 4,000 m<sup>3</sup> (more than 1 million gallons) of crude oil leaked for approximately two hours in the scraper of the Getulio Vargas refinery, in Araucária, Paraná. The accident was due to the rupture of an expansion gasket during the oil pumping from an oil terminal. Most of the spilled oil traveled across an extension of 2,800 meters still within the refinery premises until it reached the Barigui river, followed by the Iguaçú river, one of the main rivers of Paraná, leaving an oil sheen 20 km long. The spill endangered the river fauna and flora apart from interrupting the distribution of potable water to the population of nearby towns.

## **2. Brazilian regulations for prevention and response to oil spills**

On April 28, 2000, it was enacted the Law 9966 on the prevention, control and inspection of pollution caused by the releasing of oil and other harmful or dangerous substances in waters under national jurisdiction. The facilities regulated by Law 9966 are the organized ports, port installations, platforms and ships in Brazilian waters. The provisions of the Law 9966 include:

- the requirement for the facilities to elaborate an internal proceedings manual for the management of the pollution risks;
- the requirement for the facilities to prepare individual emergency plans for the combat of pollution by oil and other harmful and dangerous substances, which must be approved by the competent environmental authority;
- the requirement for the competent environmental authority to consolidate the individual emergency plans, in the form of local or regional contingency plans, in articulation with the civil defense authorities;
- the requirement for the notification to the competent environmental authority, the maritime authority and the oil industry regulating agency, of any incident which might cause water pollution;
- the obligatory compensation to the competent authorities for expenses made in order to control or minimize the pollution caused;
- the attribution to the maritime authority, the competent environmental authority and the oil industry regulating agency of the responsibilities for the enforcement of the Law.

The bill of the Regulating Decree of the Law 9966, which defines sanctions for violating the established rules, should shortly be enacted.

Following the accident occurred in January 2000 in the Guanabara Bay, the National Environment Council (CONAMA) issued Resolution 265/00, which requires that the competent authorities elaborate or revise, within a 12 month period, the national contingency plan and the regional, state and local environmental emergency plans for accidents caused by the oil industry.

In response to the requirements of Law 9966 and Resolution 265 two workgroups were established by the Ministry of Environment in order to develop proposals for regulations concerning

the Individual Emergency Plans, Area Plans and the National Contingency Plan. These workgroups have participants of the following institutions:

Facility Emergency Plans and Area Plans

Ministry of Environment (Coordinator)

Brazilian Institute of Environment and Renewable Natural Resources – IBAMA

Ports and Coast Directorate / Brazilian Navy – DPC/MB

General Navigation Directorate / Brazilian Navy – DGN/MB

Ministry of Transportation

Ministry of Mines and Energy

National Petroleum Agency – ANP

Brazilian Petroleum and Gas Institute – IBP

São Paulo State Environment Sanitation Agency – CETESB

National Contingency Plan

Ministry of Environment (Coordinator)

Brazilian Institute of Environment and Renewable Natural Resources – IBAMA

Navy Headquarters (EMA/MB)

Ports and Coast Directorate / Brazilian Navy – DPC/MB

General Navigation Directorate / Brazilian Navy – DGN/MB

Ministry of Mines and Energy

National Petroleum Agency – ANP

By the end of May 2000, the workgroups concluded their respective proposals. Concerning the Individual Emergency Plan, the proposal is to be approved by CONAMA plenary for further promulgation in the form of a Resolution.

Box 1 presents the contents of the Individual Emergency Plan. The Individual Emergency Plan must be presented for approval by the competent environmental authority together with a document containing referential information. The contents of this document is shown in Box 2.

### **Box 1 – Contents of the Individual Emergency Plan**

1. Facility information
2. Accidental scenarios
3. Response information and procedures
  - 3.1. Oil spill alert systems
  - 3.2. Incident communication
  - 3.3. Response organizational structure
  - 3.4. Response equipment and materials
  - 3.5. Response operational procedures
    - 3.5.1. Procedures for interruption of oil discharge
    - 3.5.2. Procedures for oil containment
    - 3.5.3. Procedures for protection of vulnerable areas
    - 3.5.4. Procedures for monitoring spilled oil
    - 3.5.5. Procedures for oil recovery
    - 3.5.6. Procedures for mechanical and chemical dispersal
    - 3.5.7. Procedures for cleanup activities
    - 3.5.8. Procedures for collecting and disposal of recovered oil and waste materials
    - 3.5.9. Procedures for deployment of resources
    - 3.5.10. Procedures for obtaining and updating relevant information
    - 3.5.11. Procedures for registering response actions
    - 3.5.12. Procedures for protection of public health and safety
4. Closing of operations
5. Maps, nautical charts, plants, drawings and photographs
6. Annexes

## **Box 2 – Contents of the Facility Emergency Plan Annex**

1. Introduction
2. Risk identification and evaluation
  - 2.1. Risk source identification
  - 2.2. Accidental hypotheses
    - 2.2.1. Worst case discharge
3. Vulnerability analysis
4. Response training and exercises

The National Contingency Plan for Oil Pollution Incidents in Brazilian Jurisdictional Waters (PNC) is the document which fixes responsibilities, establishes a national organizational structure and defines the guides for the coordination of government authorities and private entities in oil pollution incidents which can affect Brazilian waters or/and those of neighboring countries. The PNC must be put into action in the case of oil pollution incidents found relevant according to pre-established criteria in order to facilitate or increase the polluters response capabilities.

The PNC's organizational structure will be composed of a National Authority, two authorities responsible for Sectorial Coordinations and by a Support Committee. The National Authority will be exercised by the Ministry of Environment while the Sectorial Coordination will be divided as hereunder:

- in oil pollution incidents occurred offshore, the Sectorial Coordination will be exercised by the Brazilian Navy;
- in oil pollution incidents occurred in interior waters, the Sectorial Coordination will be exercised by IBAMA.

The institutions included in the Support Committee are:

- the Ministry of Environment
- Brazilian Institute of Environment and Renewable Natural Resources – IBAMA
- the Ministry of Defense, through the Navy Command, the Air Command and the Army Command
- the Ministry of Justice, through the Federal Police
- the Ministry of Exterior Relations
- the Ministry of National Integration, through the National Civil Defense General Office
- the Ministry of Treasury, through the National Treasury General Office and the Federal Revenue General Office
- the Ministry of Planning, Budget and Management
- the Ministry of Transportation, through the Transport National Agency
- the Ministry of Labor
- the Ministry of Mines and Energy, through the National Petroleum Agency
- the Ministry of Health, through the National Sanitary Vigilance Agency
- the Ministry of Agriculture, through the Weather Forecasting National Institute
- other federal, state and municipal institutions when necessary

After receiving an oil spill notification, the corresponding Sectorial Coordination, after checking the relevancy of the incident, must designate or activate an Operational Coordinator for evaluation of the response actions as stated in the Individual Emergency Plan or Area Plan, informing the National Authority on the incident situation.

In case there is evidence that the procedures adopted are not adequate and that the equipment and materials are insufficient, the PNC structure must be activated immediately by the Operational Coordinator in order to facilitate and increase the response capabilities of the polluter. In case the Sectorial Coordination considers that the handling of the response actions by the polluter is inadequate, the Operational Coordinator must take over the coordination and the command of the response actions. In order to make the response actions feasible, the corresponding Sectorial Coordination must set in motion, according to the case, the institutions of the Support Committee.

### **3. Conclusions**

During the past years, Brazil has been experiencing major changes in the oil sector, mainly related to the end of the monopoly practiced by Petrobras (Brazilian state oil company) as well as the new regulations for the sector, still in the building up process. Simultaneously, the occurrence of severe accidents showed the need for establishing directions and regulations for planning and response to oil spill accidents in Brazil. These actions are presently concentrated on the formulation of a National Contingency Plan as well as the regulation concerning the Individual Emergency Plans, as required by Law 9966.

Despite the existing difficulties related to institutional and structural problems as well as deficient capabilities of some agencies within this process, important progress has been obtained. The Individual Emergency Plan regulation should be approved in the near future. As to the National Contingency Plan, expectation is that concepts proposed mature for further promulgation through a Presidential decree. Its actual implementation, however, will depend on solid investments to improve the capabilities of the institutions involved – presently quite precarious – to fulfill their roles and responsibilities.